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"How and Why Should I Study?": Metacognitive Learning Strategies and Motivational Beliefs as Important Predictors of Academic Performance of Student Teachers

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Abstract

The study examined the relationship between metacognitive learning strategies and motivational beliefs, predicting academic performance of student teachers. The main aim of the study was to examine the predictive value of motivational beliefs and metacognitive learning strategies for students' academic performance. In the study 307 student teachers of the Faculty of Education completed the revised version of Motivated Strategies for Learning Questionnaire (Pintrich & de Groot, 1990). Regression analyses revealed that a higher sense of self-efficacy predicted better academic performance and a higher test anxiety predicted poorer academic performance. The implications of motivational orientation for cognitive engagement and self-regulation at the faculty are discussed.

Keywords: *motivational beliefs self-regulated learning, metacognition, students*

Introduction to metacognition and learning motivation

The term self-regulation involves the ability to control and regulate one's behaviour, cognition, and emotions (Bakračevič Vukman & Licardo, 2011). It represents an important aspect of student learning and academic performance in the classroom context (Corno & Mandinanch, 1983; Corno & Rohrkemper, 1985). The concept of self-regulated learning, which derives from the latter (Zimmerman

& Schunk, 2001), is in fact learning which involves the regulation of cognition (control over cognitive learning strategies), the regulation of motivation and affect while learning (control over motivational beliefs and emotions), and the regulation of behaviour.

Peklaj (2001) notes that metacognition includes two major components: i) knowledge about cognition (declarative, procedural and strategic knowledge.) and ii) control of cognition (processes that facilitate the control aspect of learning, such as planning, monitoring the learning process and the quality of achievement, and evaluation of the learning process).

A meta-analysis as defined by Dinsmore, Alexander, and Loughlin (2008) surely contributed to the clarity of the above-mentioned concepts, concluding that the definition of the term metacognition referred in particular to the cognitive aspect of learning. The definitions of the terms self-regulation and self-regulated learning comprise, along with the cognitive aspect, also significant motivational factors and emotional aspects of learning (Peklaj & Pečjak, 2011).

The results of previous research on the relationship between metacognition and academic performance are relatively inconsistent (Peklaj, 2001). Some authors (Corno & Mandinach, 1983; Zimmerman & Pons, 1988) note that there is a highly positive relationship between the use of metacognition and academic performance. Thus, some studies indicate that the learners who keep their focus on solving a specific cognitive problem and persist with a specific task perform better than learners who cannot control their attention to the same extent (Corno & Mandinach, 1983; Zimmerman & Pons, 1986; 1988, Čagran, Ivanuš Grmek, Štemberger, 2009).

The theoretical framework for conceptualising the motivation of an individual was derived, just like in previous studies (Pintrich & de Groot, 1990, Puklek Levpušček & Peklaj, 2007), from a three-component motivation model (Pintrich & de Groot, 1990; Wiegfield & Eccles, 2001), which proposes three general motivational components associated with learning: value, expectancy, and affect.

The value component concerns the reasons why students become involved in an instructional activity. It includes intrinsic goal orientation, extrinsic goal orientation, and internal task value (Puklek Levpušček & Peklaj, 2007). Various studies (Meece, Blumenfield, & Hoyle, 1988; Pintrich & Garcia, 1991; Boekaerts, 1997) have shown that the individuals that possess intrinsic motivation would use significantly more metacognitive skills, persist considerably longer in learning, and put more effort in an activity than those that do not have the value component of motivation.

The expectancy component is, within different motivational models, defined as the student's perceived personal competence, self-efficacy, attribution style, etc. (Pintrich and de Groot, 1990). It concerns the student's beliefs whether he/she is capable of performing specific tasks and whether he/she is responsible for such performance. In correlational studies, the degree of perceived self-efficacy is closely related to efficient performance of a task and thus to good academic performance (Bandura, 1986; Bandura, Barbaranelli, Caprara, & Pastorelli, 1996). Students with a high level of self-efficacy use self-regulated learning strategies more frequently (Pintrich, Roeser, & de Groot, 1994).

The affective component, representing the emotional response of an individual to a school task, in the motivational model is primarily measured through one's test anxiety, since it is one of the most significant variables in the school context (Wigfield & Eccles, 1989; Pintrich & de Groot, 1990). It could be described as fear and discomfort together with cognitive (learning) difficulties (Isaac & Orit, 1997). Studies have shown that test anxiety is associated with the fear of grading and evaluation, general rejection of tests, and less efficient learning skills (Hembree, 1988). Furthermore, it has been identified as one of the factors that compromise one's academic functioning (Everson & Millsap, 1991; Gregory, 1990). In addition, research has shown that there is a strong correlation between test anxiety and metacognition, the use of cognitive strategies, and balancing the effort put in a specific task (Pintrich & de Groot, 1990; Peklaj, 2001). Peklaj (2001) notes that the relationship between test anxiety and performance is usually negative, which some other studies have confirmed (Pintrich & de Groot, 1990), pointing out that students with a higher level of test anxiety show lower academic performance.

Research Focus

The study focused on two main research questions:

1. to examine the correlation and interaction between motivational beliefs and metacognitive learning strategies according to the level of one's expressed motivational beliefs.
2. to establish if there was any correlation among motivational beliefs, the use of metacognitive strategies and academic performance and consequently examine the potential predictive value of measured variables for students' academic performance.

Research Methodology

Research General Background

The descriptive method was used to establish the level of students' expressed motivational beliefs and metacognitive strategies and the explicative method was employed to determine the correlation between motivational beliefs and metacognitive learning strategies according to the level of expressed motivational beliefs, the differences according to participants' age and consequently examine the potential predictive value of the measured variables for students' academic performance.

Research Sample

The research included 307 students (96.4% female and 3.6% male) enrolled in the Faculty of Education at the University of Primorska and the Faculty of Education at the University of Maribor. The participants were students of Preschool Teacher Education (51.1%) and Primary Teacher Education (48.9%) programmes, with the mean age of 20.35 years (19–24 years). The participants mainly attended the first year (156 students – 50.8%) and the second year of study (121 students – 39.4%), and a few of them were older (third year: 28 students – 9.1% and fourth year: 2 students – 0.7%). The statistical analysis of the data was performed using SPSS 20.0 statistics software.

Instrument and Procedures

In the study we used the revised Slovene version of the Motivated Strategies for Learning Questionnaire or MSLQ (cf., Pintrich & de Groot, 1990). In revised version, however, we used a 5-point scale (1= not at all true, 5= very true). Originally, the questionnaire is composed of five subscales, i.e., three motivational scales – Intrinsic Value, Self-Efficacy, and Test Anxiety – and two cognitive subscales, namely, the Cognitive Strategy Use scale and Self-Regulation scale (Pintrich & de Groot, 1990).

Data Analysis

Data were processed with the use of SPSS (20.0). According to the aims of the study, the following statistic methods were employed:

- Descriptive statistics (M, SD), the Spearman correlation coefficient,
- two- and three-way ANOVA and multiple regression analyses.

Research Results

Motivational beliefs and metacognitive learning strategies according to the level of expressed motivational belief

The results indicated (cf., Table 1) that there is a significant moderate to high correlation between the students' motivational beliefs and the use of metacognitive learning strategies. In particular, we found a high positive correlation between metacognitive strategy use and intrinsic value of study. The correlation between metacognitive strategy use and the participants' self-efficacy was also high, positive and significant. On the other hand, as expected, the correlations between test anxiety and metacognitive strategy use and also between test anxiety and self-efficacy were low and negative.

Table 1. Correlations between motivational beliefs and metacognitive learning strategies

Variables	IV	SE	TA	MeCog
IV	-			
SE	.43**	-		
TA	.01	-.25**	-	
MeCog	.49**	.45**	-.12*	-
M	3.49	3.33	2.90	4.04
SD	0.55	0.61	0.88	0.52

Legend: N= 289; * statistically significant at level 0.05; statistically significant at level 0.01; IV – intrinsic value, SE – self-efficacy, TA – test anxiety, MeCog – metacognitive learning strategies

Further, we examined the possible differences and the potential interactions between specific motivational beliefs and metacognitive learning strategy use. For this purpose, we dichotomized the motivational learning components according to their median value. Then, we used three-way ANOVA for two intrinsic values (low intrinsic value, high intrinsic value) × two self-efficacy (low self-efficacy, high self-efficacy) × two test anxiety (low test anxiety, high test anxiety) × metacognitive learning strategies. Descriptions presented in Table 2.

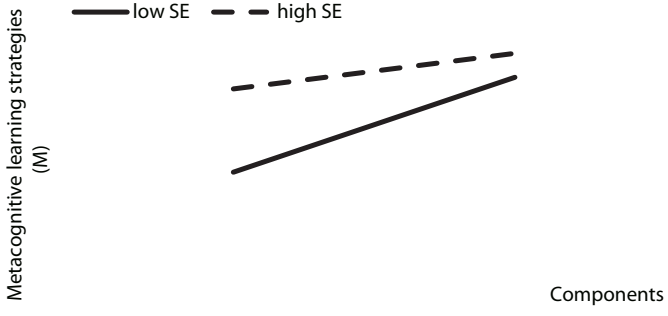
Table 2. Descriptions of metacognitive learning strategies for high and low expressed intrinsic value of study and sense of self-efficacy

		Metacognitive learning strategies	
Motivational beliefs		**M**	**SD**
IV	Low	3.89	0.33
	High	4.23	0.43
SE	Low	3.92	0.45
	High	4.21	0.29

Legend: N= 289; IV – intrinsic value, SE – self-efficacy

The results indicated significant differences in the use of metacognitive learning strategies according to the reported intrinsic value of study, F (1, 281) = 32.66, $p < .001$ (ω2=0.09) and according to the level of the students' reported self-efficacy, F (1, 281) = 22.14, $p < .001$ (ω2=0.07). Differences in the use of metacognitive learning strategies according to low and high test anxiety were not significant.

The results also revealed a significant intrinsic value × self-efficacy interaction, F (1, 281) = 6.73, $p < .05$ (ω2=0.02, mean values as in Figure 1), indicating that the students who used metacognitive learning strategies more often reported a higher intrinsic value of study and a higher sense of self-efficacy. On the contrary, the students who used less metacognitive learning strategies reported a lower intrinsic value of learning along with a lower sense of self-efficacy. Consequently, the students with a lower sense of self-efficacy and a low intrinsic value of study significantly less often reported the use of metacognitive learning strategies than the students with a high sense of self-efficacy and a high intrinsic value of study.



Legend: SE – self-efficacy, IV – intrinsic value

Figure 1. Interaction between intrinsic value of study and self-efficacy depending on the use of metacognitive learning strategies.

Motivational beliefs and metacognitive strategy use as predictors of academic performance

Firstly, we considered the differences in motivational beliefs and metacognitive learning strategies in relation to final high school grades. Three-way ANOVA was conducted for three motivational beliefs (intrinsic value, self-efficacy, test anxiety) × metacognitive learning strategies × final high-school grades (sufficient, good, very good, excellent). Score analysis revealed significant final high-school grade differences for the intrinsic value of study F (3, 281) = 5.87, $p < .01$, (ω2=0.02, mean values as in Table 3) and in the metacognitive learning strategy use, F (3, 281) = 4.65 $p < .01$, (ω2=0.01, mean values as in Table 3).

Table 3. Average mean value for intrinsic value of study and metacognitive strategy use according to final high school performance/grade

Final high-school performance (grade)	Intrinsic value (M)	Metacognitive learning strategies (M)
Sufficient	3.54	4.20
Good	3.29	3.90
Very good	3.54	4.06
Excellent	3.65	4.23

A detailed post-hoc pairwise comparison of mean differences indicated the same pattern of differences in the final high-school grades with regard to the intrinsic value and the use of metacognitive learning strategies. We found out that significant differences in the intrinsic value component occurred between the students with the 'good' and 'very good' final high-school grades (dM intrinsic value =- 0.25, $p < .01$) in favour of the 'very good' grade. Moreover, significant differences in the intrinsic value and metacognitive learning strategy use occurred also between the 'good' and 'excellent' final high-school grades (dM intrinsic value =- 0.36, $p < .01$; dM metacognitive learning strategy use =- 0.33, $p < .01$) in favour of the 'excellent' grade. We can conclude that the students with higher high-school grades report a higher intrinsic value of study and more frequent use of metacognitive learning strategies later on, at university level, as opposed to the students with lower high-school grades.

Considering that there is a low non-significant correlation between final high-school grades and average grades in the first year of study at university (r =.13, $p > .05$), we separately examined the predictive value of motivational beliefs and the predictive value of metacognitive learning strategies for academic performance.

We performed linear regression analysis with Enter model for all predictors (Field, 2009). In the first regression analysis, the average grade in the first year of study represented the criterion variable, while three motivational beliefs (intrinsic value, self-efficacy, and test anxiety) and metacognitive learning strategies were the predictors. The results revealed a significant predictive value of the above-mentioned components for first-year academic performance, R2 =.20, F (3, 137) = 11.09; *p <.001;* with the students' self-efficacy and test anxiety scoring the highest predictive value (as shown in Table 4). The intrinsic value of study had no significant predictive value for academic performance.

Table 4. The results of linear regression analysis of academic performance at university with regard to the level of motivational beliefs and metacognitive learning strategies

Variable	B	SE	β	t	*p*
Intrinsic value	-.12	.12	-.09	-1.02	*ns*
Self-efficacy	.44	.10	.37	4.24	*.000*
Test anxiety	-.17	.07	-.20	-2.54	*.012*
Metacognitive strategies	-.01	.12	-.01	-1.04	*ns*

Legend: ns – variable has no statistically significant predictive value

Discussion

Our first research question focused on the relationship between motivational beliefs and the use of metacognitive learning strategies. We examined correlations and differences in the use of metacognitive learning strategies with regard to different levels of expressed motivational beliefs. As for the results, there was a positive moderate correlation between the intrinsic value of study and the students' perception of their own self-efficacy as well as the use of metacognitive strategies in learning. Similarly, there was a relatively positive correlation between the sense of self-efficacy and the use of metacognitive strategies. In line with our expectations, the results indicated a low negative correlation between test anxiety and the sense of self-efficacy as well as between test anxiety and metacognitive strategies. Other studies (Hill & Wigfield, 1986; Pintrich & de Groot, 1990) reported similar results, as test anxiety was also negatively correlated with self-efficacy. A more in-depth analysis of the results revealed that there were significant differences in the use of metacognitive strategies with regard to a specific motivational belief. At the same time, there was an ongoing interaction between the intrinsic value of study and the

sense of self-efficacy. Thus, we came to the conclusion that the students who reported a higher intrinsic value of study, displayed strong intrinsic motivation and interest in learning, understood the sense of the effort they put in, as well as had a clear goal and purpose of their study, were the same students that reported significantly more frequent use of metacognitive strategies and a high level of personal competence. The interaction among the above-mentioned motivational beliefs showed that the students with a strong sense of self-efficacy used metacognitive skills and strategies to relatively the same extent, regardless of whether they had either low or high intrinsic values. On the other hand, the students that reported a weak sense of self-efficacy in study assignments used considerably fewer metacognitive strategies in combination with a low value of study than in combination with a high value of study. In light of this, we concluded that it was particularly reasonable and important for the teacher to incite and maintain the student's intrinsic motivation to study, enhance the intrinsic value of study as well as the interest in learning and the fulfilment of study requirements. The latter does not merely represent an investment in one's academic achievements but, above all, an enhancement of the student's interest in daily cognitive activity while performing study assignments.

The second research question focused on establishing how motivational beliefs and the use of metacognitive strategies correlated with high-school performance, determining also the potential predictive value for the later academic performance at university. Based on the results, we discovered significant differences in the self-reported intrinsic value of learning and the frequency of metacognitive strategy use in relation to the last year of high school grades. A more detailed analysis revealed a similar pattern in both measured components of learning: the students who performed better at high school either had a higher intrinsic value or used metacognitive strategies more frequently. However, a high level of intrinsic goal orientation towards acquiring certain knowledge and mastering certain skills, etc. proved to be a better predicting factor for long-term learning, better learning strategies, cognitive engagement and continued study (Puklek Levpušček & Peklaj, 2007, Kukanja Gabrijelčič, 2015). Certain studies indicate that students who know and use metacognitive strategies report better academic performance than students who do not use them (Garner & Alexander, 1989; Schneider, Schlagmueler, & Vise, 1998). Yet, some studies indicate a zero correlation between metacognitive engagement and academic performance (Pressley & Gathala, 1990). Our results were similar to the latter. We believe that the results of regression analyses to a certain extent reflect the above methodological conceptual problem. The intrinsic value of study and the use of metacognitive strategies had no predictive value in our model, while academic performance at university could be predicted solely

based on the student's perceived self-efficacy in learning and the absence of test anxiety. Taking into account that there was a positive correlation between self-efficacy and the use of metacognitive strategies, we could establish that cognitive strategies were merely a factor that facilitated certain academic performance. In fact, the perception of one's own competence with regard to facing everyday requirements of the study was considerably more relevant in predicting academic performance in our sample. This might indicate that teaching students how to use cognitive strategies is important for academic performance in secondary school, while in order to predict academic performance, it is more essential to build and enhance one's belief that one possesses the knowledge and the ability, and can expect a successful outcome based on the effort one puts into learning.

Limitations of the study and further research suggestions

The study also has some limitations in terms of the representative sample (age, gender, and regional belonging) and the use of self-evaluation scales (they merely indicate the perceived level of the measured components). Altogether, the results might have been considerably more reliable and unambiguous, provided we had focused on motivational beliefs and the use of metacognitive strategies in a more specific academic area or subject or if we had defined academic performance more specifically (e.g., preparation of a seminar paper, grade obtained in a preliminary exam, etc.).

Conclusions

The presented study is an important contribution to understanding the way in which the academic milieu at teacher education faculties functions. It shows that teaching students how to use relevant learning techniques is not sufficient to guarantee satisfactory academic performance by the students. It is important that the system of academic programmes at university should be designed to create an academic milieu within which the study requirements are adequately ambitious and adapted to an individual and in which learning is a challenge and a means of building one's personal competences. It could contribute a great deal to shaping one's academic self-image and the sense of one's self-efficacy. This would result in a high level of motivation for cognitive engagement and hence, in a greater quality of academic achievement.

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